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ABSTRACT

Many studies have hypothesized a developmental relationship between children's chronological and mental ages and their intrapersonal perceptions of internal and external control. To investigate longitudinal changes in children's locus of control, 97 elementary school children, between the ages of 8 and 13, were administered the Children's Nowicki/Strickland Locus of Control Scale annually for 3 years. An analysis of the results showed that children's mean locus of control scores were significantly different from one age group to the next as well as from one year to the next. Older children had significantly more internal scores than younger children, and the same 97 children, each succeeding year, demonstrated significant increases in internal perceptions. No significant differences between sexes were observed in this generally linear developmental trend. The study supports the hypothesis that increases in internal perceptions are associated with growing older. (Author/BL)

DEVELOPING PERCEPTIONS OF CONTROL: CROSS-SECTIONAL AND LONGITUDINAL ANALYSES

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Abstract

Elementary school children between the ages of eight and thirteen were administered the Children's Nowicki/Strickland Locus of Control Scale annually for three years. As predicted, children's mean locus of control scores were found to be significantly different from one age group to the next (a cross-sectional analysis) as well as from one year to the next (a longitudinal analysis). Older children had significantly more internal scores than younger children, and, the same 97 children, each succeeding year, demonstrated significant increases in internal perceptions. No significant differences between sexes were observed in this generally linear developmental trend. The study supports the hypothesis that increases in internal perceptions are associated with growing older. The data are explained using a confluent theoretical perspective drawing upon cognitive as well as behavioral theory.

DIVELOPING PERCEPTIONS OF CONTROL: CROSS-SECTIONAL

AND LONGITUDINAL ANALYSES[1]

From a social learning theorist's perspective (Rotter, 1966; Nowicki & Strickland, 1973) the construct, locus of control, has been defined essentially as a generalized expectancy regarding the perceived causal relationship between behavior and its consequences. Persons holding an expectancy of internal control perceive events and consequences as contingent upon their own behaviors. Persons with an external perception fail to see the connection between their efforts and their consequences, or they may attribute causality to others, or possibly to random events, which is to say, luck. Besides social learning theorists, other theoretical orientations such as the "attribution" perspective coming from a more Heiderian (Heider, 1958) point of view (e.g., Weiner, 1979; deCharms, 1976) would essentially describe this behavior in a somewhat similar manner.

Many studies have hypothesized a developmental relationship between children's chronological as well as mental ages and their intrapersonal perceptions of internal and external control. As a developmental phenomena, several theorists have predicted that these perceptions of control should become more associated with the self over time. Lefcourt (1976) believes that age is one of the most obvious factors associated with changes in causality perception, specifically in the direction of increasing internality. Several other researchers have also made this prediction based on the notion that as children grow older they increase their actual competence in manipulating and adapting to the environment, and, in general, become more independent (Bialer, 1961; Crandall, Katkovsky & Crandall, 1965). Reinforcement of the perception of personal control may be associated

with successful interactions with the environment; i.e., what White (1959) has described as "competence" which leads to "effectance motivation." Some developers of instruments which measure perceptions of control have even suggested that age increases and increases in internal perceptions might be one criterion of validity for these scales (Nowicki & Strickland, 1973; Nowicki & Duke, 1974).

Verifying the predicted developmental relationship between changing ages and increases in internal perceptions would, then, appear to be a worthy and significant research effort. Not only might this research establish credibility for the locus of control construct itself, but the validity as well as reliability of locus of control instruments might also be confirmed. Two possible approaches to accomplishing such a task would be to examine children of differing ages (a cross-sectional design) and measuring the same children over time as they grow older (a longitudinal design). For the most part, this effort has been accomplished by several researchers using cross-sectional designs. This approach is open to criticisms of bias such that the data do not reflect individual changes over time as well as the possibility that generational effects may influence the outcomes. Both of these sources of bias are excluded from longitudinal designs which do try to account for individual changes over time, and, since the subjects are their own controls, as in a repeated measures analysis, generational differences may be excluded as a source of bias. However, as Shaie (1982) has pointed out, even longitudinal analyses are not free from bias. Shaie (1982) suggests that in longitudinal analyses multiple cohorts should be examined to insure external validity. By including replications within a longitudinal analysis, a study may more credibly generate normative

laws.

It is not surprising, then, that quite mixed findings have been reported when locus of control studies are examined using cross-sectional developmental designs. Weisz & Stipek's (1982) review of this issue is quite informative with regard to the number of studies reporting significant developmental trends being associated with locus of control perceptions. They suggest that past research findings are somewhat mixed with regard to the predicted developmental trend of increasing internality. They conclude that "...it is fair to say that studies showing significant developmental increases in number of internal responses are outnumbered by those not showing such effects" (Weisz & Stipek, 1982, p. 255). They comment further discussing Brim's (1974) distinction between locus of control scale types. Brim (1974) suggests two scale types: (1) the "choice-of-attribution scale" and (2) the "agree-disagree scale." This distinction between scale types has been suggested by Weisz & Stipek (1982) as an important consideration in interpreting and generalizing past research on the development of children's perceptions of control. This may be an especially important distinction in that they note that while more than half of the 20 studies using "agree-disagree scales" show significant developmental increases in internality, of the 14 "choice-of-attribution scales" reported, only three found this predicted relationship. Thus, the studies using "choice-of-attribution scales" are much more inconclusive than those studies using "agree-disagree scales."

The vast majority of studies which Weisz & Stipek (1982) review are cross-sectional in design. The only longitudinal study which they report is an analysis of 87 first graders' perceptions of control over

a seven month period of time (Stipek, 1978). This study found significant increases in internality at the end as contrasted with the beginning of the school year. These results were also moderated by the children's socio-economic class where the increases were greater for lower, than for middle socio-economic classes. Stipek's (1978) study used the Educational Testing Services Locus of Control Picture Test for Children. This instrument would be described by Brim (1974) as a "choice-of-attribution scale."

In summary, longitudinal analyses of children's developing perceptions of internal control are quite sparse. The only longitudinal study uses a single cohort and a "choice-of-attribution scale." No longitudinal analyses have been found which use an "agree-disagree scale." In fact, with the exception of Stipek's (1977) study all developmental studies examining children's developing perceptions of internal control have been cross-sectional in design.

The primary purpose of the present study has been to both longitudinally and cross-sectionally analyze children's developing personal perceptions of control. Since no longitudinal data have been found in studies using "agree-disagree scales," it is fortunate that this category of instrument was chosen for this study. Also, since many of the studies using this type of scale have found significant differences between age groups (cross-sectional analyses), it was believed that longitudinal data might further substantiate past findings indicating that as children grow older - across time - they become more internal. This pattern was hypothesized to be so for both males and females.

To accomplish this effort, a university laboratory school sample of eight to thirteen-year-old children was administered the same locus

of control scale annually, each fall for three consecutive years. Four different age cohorts of eight, nine, ten and eleven-year-old children respectively from the first year of the study were then measured each successive year for three years. Since all children in the laboratory school between the ages of eight and thirteen were measured once during each of the three years of the study, a cross-sectional analysis was also available.

METHOD

School Setting and Sample. The laboratory school from which the data were collected was administered by a midwestern university school of education. The laboratory school was used as a research facility as well as a field cite for both undergraduate pre-service and graduate student training. Many experimental programs were actively being pursued in this facility. The school annually includes approximately 243 children ranging in age from five through thirteen. Approximately 70 to 80 percent of the children's parents were affiliated with the university. Structurally there were three levels: the Primary Unit, including five, six, and seven-year-olds; Intermediate Unit, including eight, nine, and ten-year-olds. The Advanced Unit was organized into three traditionally age-homogeneous sixth, seventh and eighth grade classrooms consisting of eleven, twelve, and thirteen-year-olds respectively. Six separate classrooms each containing approximately 27 children of mixed ages were utilized in the Primary and Intermediate Units. An equal number of both sexes as well as the three age groups were placed in each of the three Primary and three Intermediate classrooms (e.g., in the three Intermediate classrooms there would be approximately nine eight-year-olds, nine nine-year-olds, and nine ten-year-olds equally

distributed between both sexes). Further descriptions of this population are contained in Sherman (1984).

The present study examined children between the ages of eight and thirteen in both the Intermediate and Advanced classrooms. There were varying numbers of children measured in each of the three years of the study: the 1980 and 1982 samples each included 169 children and the 1981 sample included 164 children. Many of the first year subjects were present during the second and third years of the study, either one or two years older respectively. Attrition of the thirteen-year-olds after the first year and the twelve-year-olds after the second year left four stable cohorts of eight, nine, ten and eleven-year-olds throughout the three year study. New groups of eight-year-olds entered the cross-sectional sample during the second and third years.

Throughout the three years of the study 97 children were continuously present. From this sample the children were divided into four age-cohorts of 22 eight, 26 nine, 24 ten, and 25 eleven-year-olds and were included in the three year longitudinal analysis. The sample sizes by age, sex and year are further specified in Tables 1 and 3 in the results section.

Instrument. Locus of control was measured by the Children's Nowicki-Strickland Internal-External Control Scale (Nowicki & Strickland, 1973). The scale has 40 declarative statements which require a "yes" or "no" response: 24 of the items are stated such that an affirmative response would be scored as "external" whereas the remaining 16 items are phrased such that a "no" response would be scored as "external." Brim (1974) would describe this as an "agree-disagree scale." Theoretically scores could range from 0 to

40, with highest scores reflecting an external orientation and lowest scores reflecting an internal orientation. Children were read the questions aloud in a standardized fashion while they read from their own copies upon which they recorded their answers.

Design and Analysis. Two separate analyses were used. The first is cross-sectional in design and examined mean locus of control by age groups and sexes for each of the three separate years. Three two-way ANOVAs were utilized to accomplish this analysis. The second analysis included a three-way within subjects ANOVA which contrasted the four age-cohorts of eight, nine, ten, and eleven-year-olds across the three years of the study. Both analyses used the Statistical Analysis System's General Linear Models procedure (Barr, Goodnight & Sall, 1979). Post-hoc contrasts were accomplished using Duncan Multiple Range Tests.

Results

Results of the study will be reported in two parts. The first part will be concerned with the cross-sectional analyses whereas the second part concerns the longitudinal design. However, some preliminary introductory remarks about the Children's Nowicki-Strickland Internal-External Control Scale should precede this presentation. KR-20 reliability statistics were computed for the children's responses each year and were found to be acceptable. The KR-20 coefficients were .72, .73 and .77 for the years 1980, 1981 and 1982 respectively. Since many recent studies in the locus of control literature have suggested multifacited dimensions within this construct rather then a single generalized expectancy, as an afterthought we attempted some preliminary factor analysis of the scale. However, due to the longitudinal nature of this study, it was

difficult to see any logical pattern evolving from the repeated measurements of the children over the three year period of time. This might be partly due to the predicted changes which were expected to happen over time. Psychometric literature (Hofmann & Gray, 1978) advises against attempting factor analysis of binary data and this may have been another reason for the confusion which was encountered in this approach. One additional approach was also attempted in which the scales 24 negatively and 16 positively phrased items were analyzed separately. Moderately significant correlations were obtained between the negatively and positively phrased items thus adding to the notion of reliability. However, since these analyses did not reveal any significantly different results than when the 40 item scale was used, only the entire scale results will be reported.

Cross-sectional Analysis. For each of the three years of the study a separate correlation coefficient was computed for the children's scores with their ages. The coefficients for each of the three years were -.39, -.47 and -.47 for 1980 (n=169), 1981 (n=164) and 1982 (n=169) respectively, all statistically significant ($p<.001$). Using Fisher's R to Z transformation, the average correlation between scores and children's ages across all three years was computed and found to be statistically significant ($r=-.45$, $p<.01$). Although this only accounts for 20 percent of the variation of scores as predicted by children's ages, it would appear that increasing internality is associated with older children.

Tables 1 and 2 present the results of three two-way ANOVAs of children's mean scores for both sexes and the six age groups throughout the three years of the study. With the one exception of sex being a significant main effect in the 1981 analysis, the age

groups remained the only significant main effect for all three years ($F(5,157)=9.30$, $p<.001$, $F(5,152)=10.20$, $p<.001$, and $F(5,157)=11.99$, $p<.001$ for the years 1980, 1981 and 1982 respectively). No significant interactions between sex and age groups occurred. Using Duncan's Multiple Range Tests the general trend obtained from post-hoc contrasts of these means revealed that younger children, primarily eight and nine years of age, were significantly ($p<.05$) more external than older children. As can be seen in Figure 1 the one consistent deviation in this trend occurred in the thirteen-year-olds who uniformly, each year appear to be more external than the twelve-year-olds. Thus, from age eleven to thirteen there appears to be a general flattening out of the trend of decreasing externality. While acknowledging the consistent change in direction of the thirteen-year-old groups each year, older children's perceptions of internality were significantly different and more internal than younger children.

Put Tables 1 & 2 and Figure 1 about here

Longitudinal Analysis. Table 3 presents the mean scores of the same 97 children, by sex, for each of the three years of the study. Table 4 and Figure 2 present the results of three different within subjects ANOVAs of the mean locus of control scores for each of the four age-cohorts by the three years of the study. In ascending order from eight to eleven years of age, each of the four age-cohorts was one year older than the next at the beginning of the study. Since several previous studies have reported differential sex patterns in children's perceptions of control, the data in table 4 are presented

separately for each sex as well as collectively for both sexes. For both sexes separately as well as when both are pooled together, the main effect for the three different years (time) was statistically significant ($F(2,86)=21.60$, $p<.0001$ for females, $F(2,92)=6.24$, $p<.002$ for males, and $F(2,186)=23.93$, $p<.001$ for both sexes combined). The main effect contrasting each of the four age-cohorts was also found to be statistically significant for each of the sexes as well as for both sexes combined ($F(3.43)=8.11$, $p<.0002$ for females, $F(3,46)=5.39$, $p<.002$ for males, and $F(3.93)=13.87$, $p<.0001$) for both sexes combined). Although no significant interaction between year of study and the four age-cohorts was encountered, when the two sex groups were analyzed separately, the combined sex analysis almost reached statistically significance ($F(6,186)=1.83$, $p<.10$).

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Duncan Multiple Range tests obtained several statistically significant post-hoc contrasts. For both sexes, separately or pooled, the children's 1980 mean scores were significantly ($p<.05$) more external than their 1981 or 1982 scores. Except for the males, the children's 1981 mean scores were significantly ($p<.05$) more external than their 1982 scores. The males mean scores in 1981 were more external than their 1982 scores, but this was not a statistically significant difference. It would appear that all four different age-cohorts increased in internality uniformly over the three years of the study.

The two age-cohorts which began the study in 1980 at ages eight and nine were not significantly different from each other, but were

both significantly ($p<.05$) different from both the ten and eleven-year-old cohorts. The ten and eleven-year-old cohorts were not significantly different from each other. This pattern was consistent for each of the sexes as well as for the analysis where the two sexes were pooled.

In summary, even though each of the four age-cohorts differed in age at the beginning of the study the general trend was for each of them to significantly increase in internality each of the three years of the study. The eight and nine-year-old cohorts were significantly less internal than the ten and eleven-year-old cohorts during the first year as well as the last or third year of the study.

One would conclude from these results that chronological age and increases in internality are significantly associated with each other. For each of the three years of the longitudinal analysis a separate correlation coefficient was computed between the 97 children's scores and their chronological ages. The coefficients for each of the three years were -.49, -.41 and -.30 for 1980, 1981 and 1982 respectively, all statistically significant ($p<.01$). Using Fisher's R to Z transformation, the average correlation between locus of control scores and children's chronological ages across all three years of the study was also statistically significant ($r=-.38$, $p<.01$).

Discussion

In conclusion it is believed that the data and analyses strongly support the hypothesized developmental trend of increasingly internal perceptions of personal control being associated with growing older. If internal perceptions of control are learned and develop as the result of experiences in adapting one's behaviors to successfully achieve a variety of goals and rewards, then the end result may be an

increasing sense of personal competence. This may also assist in the development of "effectance motivation" (White, 1959).

Some issues of internal and external validity remain questionable in this study. With regard to external validity there remains a problem of generalizing data obtained from a university laboratory school in which nearly 70 percent of the eight to thirteen-year-olds children's parents are university affiliated, are predominantly caucasian and of upper-middle socio-economic status. In spite of this caution, the uniform developmental trend of increasingly internal perceptions appears quite predictable. This might at least be accepted as evidence of the influence of this laboratory school environment upon this particular sample's personal causality attributions.

When considering internal validity Weisz & Stipek (1982) have pointed out the frailty of existing locus of control instruments for measuring the development of personal control perceptions. It is believed that the present study, which used an "agree-disagree scale" (Brim, 1974), was capable of reliably demonstrating this developmental trend. The present study's results would disagree with Weisz & Stipek's (1982) discussion of the inability of locus of control instruments to reliably measure developmental changes in causal attributions. Thus, not only does this study confirm Nowicki & Strickland's (1973) original developmental hypothesis as related to the construct validation of their instrument, but the general notion of children's developing perceptions of personal control is also indicated.

With respect to Shaie's (1982) suggestion of including multiple cohorts in longitudinal analyses, the present data would support the

necessity of this procedure when attempting to enhance internal validity. Two of the cohorts did behave somewhat differently than the other two. Each of the four age-cohorts differed in age at the beginning and end of the three year study. The cohort beginning the study at age eight increased in internal perception scores each successive year until they were ten years old. Their scores at age ten were almost exactly the same as the age-cohort beginning the study at age ten. This ten-year-old cohort then continued to increase in their mean internal scores until they were twelve years old. These two age-cohorts demonstrate the strongest example of linear increase in internality, one beginning where the other left off. The cohorts beginning the study at age nine or eleven demonstrate a similar trend of increasing internality even though their first and third year scores respectively do not dove-tail in as precise a manner as did the eight and ten-year-old cohorts. Thus even though there are differences among the four age-cohorts, the general trend was for scores to decrease across time. The only exception to this pattern occurred in the males from the nine-year-old cohort. Their scores became relatively more external from their tenth to their eleventh year. This could be due to chance fluctuation in the data. The author has no other explanation for this result.

One of the unique values of this study has been the opportunity to examine this developmental hypothesis both cross-sectionally and longitudinally. Differences between conclusions drawn from these two approaches, from a research methodology perspective, have been quite informative if somewhat confusing. The increasing variability of older children's scores encountered in the cross-sectional analyses might be interpreted two ways. First, there may be a definite upswing

back to externality associated with the thirteen-year-olds. A second interpretation might conclude a relative flattening out of the generally linear trend which begins approximately at age eleven. The longitudinal analysis, at least with respect to the eleven-year-old cohort, appears to indicate this flattening out of the downward trend by the time they reach thirteen years of age.

In general, this belief in personal control may well be one of the more important developmental tasks which one could cultivate and foster in children. Longitudinal evidence suggesting that children's perceptions of personal control can be intentionally influenced by school unique experiences over a period of time has been presented by deCharms (1976). Other more specific experiences such as school achievement have also been shown to be strongly related to children's perceptions of internality (Sherman & Hofmann, 1980; Bar-Tal & Bar-Zohar, 1977; Stipek & Weisz, 1981. Obviously since achievement test scores have been found to be strongly related to intelligence test scores (Lavin, 1965 ; Kelly, 1927; Coleman & Cureton, 1954), IQ might also be related to perceptions of internality. Nowicki & Strickland (1973) report significant relationships between "higher grade point averages but not intelligence for twelfth graders and college students" (p. 153). Nevertheless, standardized and individualized administered intelligence test scores are known to become more reliable and stable as children approach the upper age boundaries of the present sample. Thus IQ might have some influence because of its developing stability over time. However, this remains an unanswerable question in the present study. Since the laboratory school neither gave letter grades for classroom achievement, nor did it have any consistent or reliable IQ data for the children, no

empirical verification of the relationships between locus of control and achievement or intelligence can be provided.[2] Many additional factors have been identified in the locus of control literature: e.g., socio-economic-status, race, sex, etc. Thus, one might conclude that perceptions of personal control develop over time and are subject to the influence of experience. This is a more confluent theoretical perspective which considers both a cognitive as well as behavioral explanation.

One of the more interesting exceptions to the overall generally linear trend occurred uniformly in the cross-sectional analysis. Thirteen-year-olds consistently changed direction indicating relatively more external perceptions than the twelve-year-olds. This occurred uniformly throughout all three years of the study. Perhaps adolescent physical development (certainly a casual chain of events which one has little if any control over) has influenced these children's perceptions here. As children develop further into adolescence, perhaps their sense of competence and personal control, especially in areas in which they can and cannot attribute personal causality, may change from relatively internal to external perceptions. A Lewinian (Lewin, 1951) explanation of development suggests that children increase in their perceptions of reality. A Piagetian (Piaget, 1930) view would suggest that as children develop they become less ego-centric. If this were so then a rival hypothesis might predict that children would become less internal in their perceptions of control (Mischel, Zeiss & Zeiss, 1974). Perhaps children's ability to differentiate uncontrollable and noncontingent events does increase with development. In any case, the consistency of change to more external scores from twelve to thirteen years of age

suggests a curvilinear relationship, rather than a simple linear trend of increasing internality. Certainly the development into adolescence and adulthood may be accompanied by an increased awareness and differentiation of reality which is being evidenced by a more realistic perception of what one can and cannot control i.e., there are limits to personal control. Weisz & Stipek (1982) Weisz (1980) as well as Weiner (1979) acknowledge this aspect of casual attributions. Harter's (1982) recent analysis of the newly conceived and validated Perceived Competence Scale for Children, has presented developmental age differences quite similar to the present study's results. Her cross-sectional trends suggest that children increasingly become more able to make realistic judgments about their competence during the elementary school years. However, her data obtained a dramatic drop in this trend for seventh graders' (twelve-year-olds) perceptions of cognitive competence, followed by a recovery during the eighth and ninth grades. Harter's (1982) data and her conclusions regarding this shift in developmental trend would be quite congruent with and support the results and conclusions of the present study.

Because of the cross-sectional finding of change in direction from relatively internal to external perceptions between the ages of twelve and thirteen, future research might focus on the onset of adolescence as a transition period and its influence on children's perceptions of internal control. If the laboratory school had not been dissolved at the end of the 1982-83 academic year a more complete longitudinal analysis might have been possible in the future and the upward move towards external perceptions evidenced between the twelve and thirteen-year-old groups might also have been further substantiated. The original intent of this longitudinal study was to

follow six cohorts over a six year period of time, but this was made impossible due the the closing of the facility. The closing of the laboratory school also made retrieval of additional supporting data impossible since the children's records were dispersed to several other school systems. Such are the glories of longitudinal research.

In summary, elementary school children from a university laboratory school setting between the ages of eight and thirteen were administered the Children's Nowicki-Strickland Locus of Control Scale annually for three years. As predicted, children's locus of control scores were found to be significantly different from one age group to the next (a cross-sectional analysis) as well as from one year to the next (a longitudinal analysis). Older children were found to have significantly more internal scores than younger children, and, the same 97 children, each succeeding year, demonstrated significant increases in internal perceptions. No significant differences between sexes were observed in this generally linear developmental trend. The data are explained using a confluent theoretical perspective drawing upon cognitive as well as behavioral theory. This study supports the hypothesis that increases in internal perceptions are associated with growing older.

Footnotes

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[2]Although a variety of standardized achievement test results were available, none remained consistent across the various cohorts in this study. Neither was there any consistent or reliable IQ scores available.

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TABLE 1

Mean Locus of Control Scores by Chronological Age and Sex

For Each of Three Years

Age and Sex	Years 1980 (n=169) DU[a]	$\bar{M}$	n	1981 (n=164) DU[a]	$\bar{M}$	n	1982 (n=169) DU[a]	$\bar{M}$	n
Eight-year olds									
Females	A	17.88	16	A	18.00	10	A	17.91	11
Males		17.00	11		16.06	17		18.00	15
Nine-year-olds									
Females	A	16.63	16	AB	16.94	16	B	16.00	10
Males		15.20	15		14.20	10		13.56	18
Ten-year-olds									
Females	B	11.47	17	B	14.73	16	BC	11.47	17
Males		11.50	16		13.25	17		12.63	10
Eleven-year-olds									
Females	B	11.00	10	C	10.20	15	B	12.44	18
Males		11.73	15		10.58	11		14.53	13
Twelve-year-olds									
Females	B	12.88	8	C	10.69	12	D	7.62	13
Males		9.79	14		9.65	17		10.07	14
Thirteen-year-olds									
Females	B	10.83	12	C	12.57	7	CD	10.45	11
Males		12.53	19		10.06	16		9.37	19

[a]Letters indicate age groups which are significantly ($p<.05$) different from each other using Duncan's Multiple Range Tests. Within each year means with the same letter are not significantly different from each other.

TABLE 2

Three-way ANOVA of Mean Locus of Control Scores for Both Sexes (2) and Six Age Groups Across Three Years

Source	df	MS_e	F	p
Year-1980 (n=169)				
Sex	1	9.53	.44	NS
Age	5	202.41	9.30	.0001
Sex x Age	5	17.57	.81	NS
error	157	21.77	-	-
Year-1981 (n=169)				
Sex	1	90.39	4.32	.04
Age	5	213.21	10.20	.0001
Sex x Age	5	7.49	.36	NS
error	152	20.91	-	-
Year-1982 (n=169)				
Sex	1	8.90	.37	NS
Age	5	286.95	11.99	.0001
Sex x Age	5	25.68	1.07	NS
error	157	23.93	-	-

TABLE 3

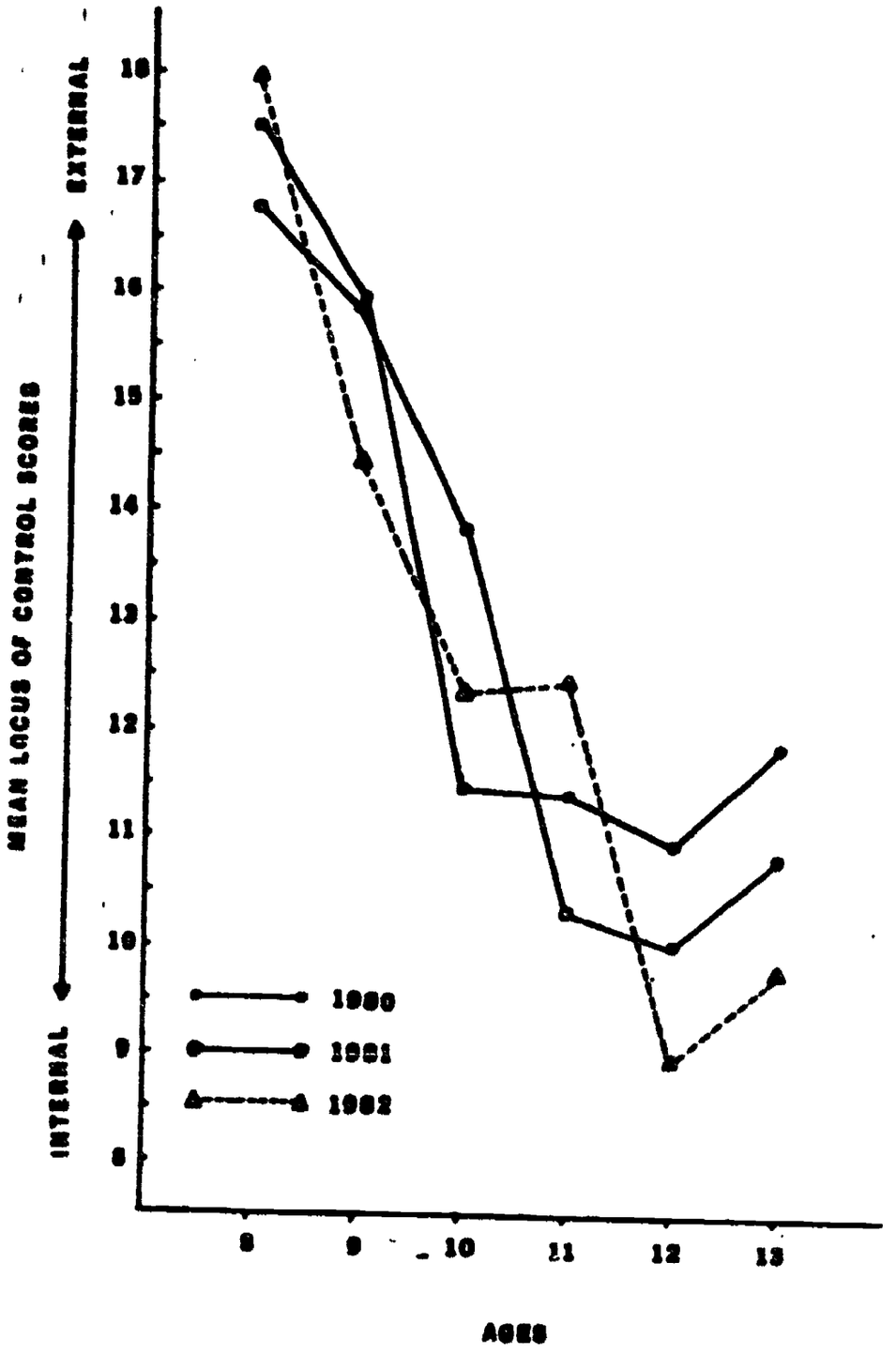
Mean Locus of Control Scores of Both Sexes Across Three Years for Four Different Aged Cohorts

Age and Sex of Subjects at Beginning of Study (1980)	n	1980 $\bar{M}$	1981 $\bar{M}$	1982 $\bar{M}$
Eight-year-olds				
Females	14	17.14	15.21	11.00
Males	8	16.38	13.63	11.88
Nine-year-olds				
Females	12	18.25	15.50	13.83
Males	14	15.50	13.50	14.93
Ten-year-olds				
Females	12	10.92	10.33	7.92
Males	12	11.67	10.92	9.50
Eleven-year-olds				
Females	9	11.67	9.33	8.89
Males	16	11.75	9.75	9.00

TABLE 4

Three-way Within Subjects ANOVA of Mean Locus of Control Scores for Females (n=47) and Males (n=50) of Four Differing Aged-Cohorts Across Three Years.

Source	df	MS_e	F	P<
Females				
Age Cohorts	3	336.64	8.11	.0002
Subjects within Age error	43	41.51		
Year	2	213.79	21.80	.0001
Age by Year	6	11.49	1.17	.33
Year by Subjects within Age error	86	9.81		
Males				
Age Cohorts	3	201.52	5.39	.002
Subjects within Age error	46	37.36		
Year	2	72.69	6.24	.003
Age by Year	6	10.07	.86	.52
Year by Subjects within Age error	92	11.65		
Females and Males				
Age Cohorts	3	529.89	13.87	.0001
Subjects within Age error	93	38.21		
Year	2	255.78	23.92	.0001
Age by Year	6	19.53	1.83	.10
Year by Subjects within Age error	186	10.69		



re 1. Mean locus of control scores by chronological age groups and sex for three years.

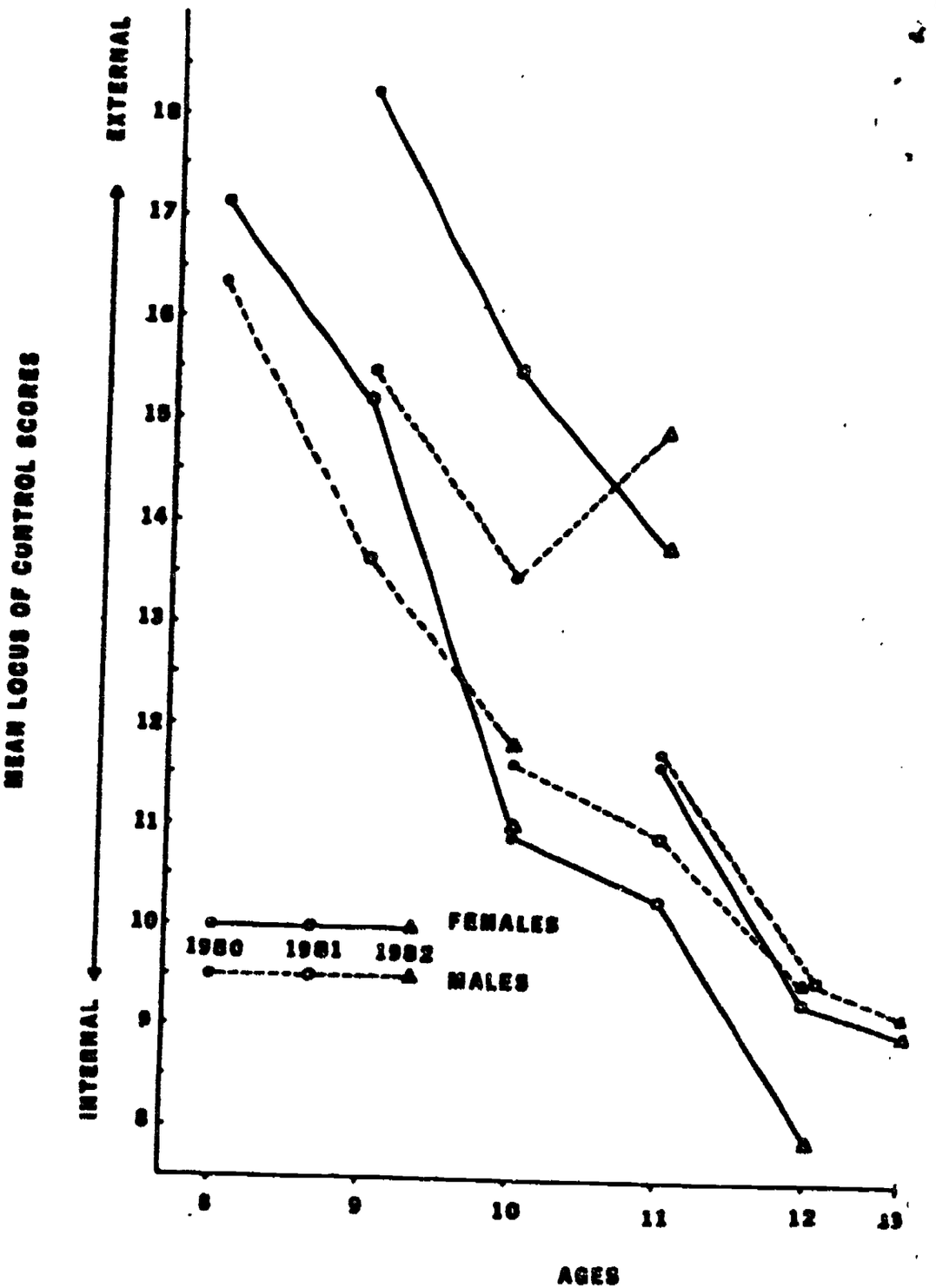


Figure 2. Mean locus of control of both sexes across three years for four different age-cohorts.